

CAR Research  
Report No. 94-06

### **NASA Tech Brief Evaluations**

Prepared by:

Gary L. Workman  
Center for Automation and Robotics  
University of Alabama in Huntsville  
Huntsville, AL 35899

Prepared for:

Technology Utilization Office  
George C. Marshall Space Flight Center  
Huntsville, AL 35812  
(205)544-0553  
Fax: (205)544-3151

Contract NCC8-18

February 1994

## **Introduction**

A major step in transferring technology is to disseminate information about new developments to the appropriate sector(s). A useful vehicle for transferring technology from the government sector to industry has been demonstrated with the use of periodical and journal announcements to highlight technological achievements which may meet the needs of industries other than the one who developed the innovation. To meet this end, NASA has very successfully pursued the goal of identifying technical innovations through the national circulation publication; *NASA Tech Briefs*. At one time the Technology Utilization Offices of the various centers coordinated the selection of appropriate technologies through a common channel. In recent years, each NASA field center has undertaken the task of evaluating submittals for Tech Brief publication independently of the others. The University of Alabama in Huntsville was selected to assist MSFC in evaluating technology developed under the various programs managed by the NASA center for publication in *the NASA Tech Briefs* journal.

The primary motivation for the *NASA Tech Briefs* publication is to bring to the attention of industry the various NASA technologies which, in general, have been developed for a specific aerospace requirement, but has application in other areas. Since there are a number of applications outside of NASA that can benefit from innovative concepts developed within the MSFC programs, the ability to transfer technology to other sectors is very high. In most cases, the innovator(s) are not always knowledgeable about other industries which might potentially benefit from their innovation. The evaluation process can therefore contribute to the list of potential users through a knowledgeable evaluator.

## **Evaluation Criteria**

The rating system used for this work is given as:

Rating of 1 will be accepted for publication in *NASA Tech Briefs* and includes technology that is of wide-ranging impact for other industries or applications. These innovations may prove to have a notable effect for society or the economy. In some cases, these developments may provide

products which are very much improved as compared to earlier items available. In the evaluations made in this work, a number of innovations rated at this level did not always apply to a large public sector, but did represent a major improvement in technology. In each evaluation the novelty, technical significance, and commercial appeal were specifically addressed.

Rating of 2 is given to those innovations which apply to specific problems or are of interest to particular groups in science or industry. These items are reserved for publication in NASA Tech Briefs upon space available.

A rating of 3 was given to innovations which lacked sufficient technical significance to be published in the journal. In some cases, multiple entries consisting of interdependent developments were submitted, that when evaluated by themselves, did not meet the necessary criteria for publication. However, in summarizing the overall achievements outlined in the reported disclosures, a rating of either 1 or 2 was obtained with the rationale for the evaluation given in the evaluation commentary.

A rating of 4 was given only to those submissions in which a reasonable evaluation could not be made without further information. This rating was not needed very often since most submissions did contain enough information to make reliable evaluations. Out of the 321 items evaluated in this work, only 12 submissions received a rating of 4. Upon conclusion of this grant, none of these items had been resubmitted for further evaluation.

### **Technical Disciplines Evaluated**

The 321 submissions evaluated in this work covered an extremely broad range of disciplines. In each submission, a UAH faculty member or researcher with appropriate background and experience, was assigned to perform the evaluation. The fields included in these evaluations included the following disciplines:

- Life sciences
- Electronic systems
- Physical Sciences
- Mathematics and Information sciences

- Materials
- Fabrication Technology
- Computer Programs
- Mechanics and Machinery

In general the largest number of evaluations belong to the general disciplines listed above, however, they could also quite broadly be defined to the following technical areas, roughly in order of decreasing activity:

- Aerospace systems
- Materials joining
- Control systems
- Microgravity materials processing
- Space operations
- Space exploration activities

## **Personnel**

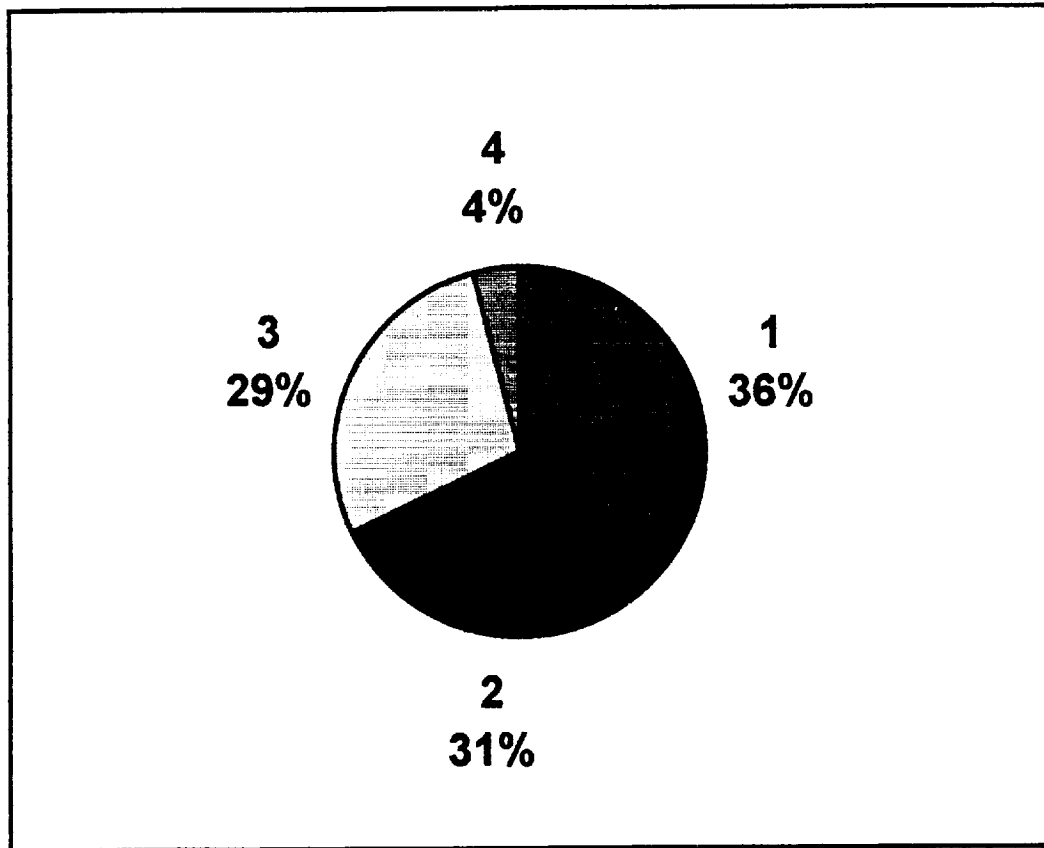
Dr. Gary L. Workman, a senior research scientist in the Center for Automation and Robotics, managed the activities related to receiving the submissions from MSFC and assigning them to the evaluation team. In order to obtain the broadest technical capabilities possible, the evaluation team was composed of members from the Research Centers, the School of Engineering and the School of Science. One external evaluator was used to evaluate some of the more esoteric optics submittals. All the other evaluators were located on campus.

Ms. Helen Garrett assisted in the management of the evaluation records and provided timely data about the project throughout the effort.

## **Results**

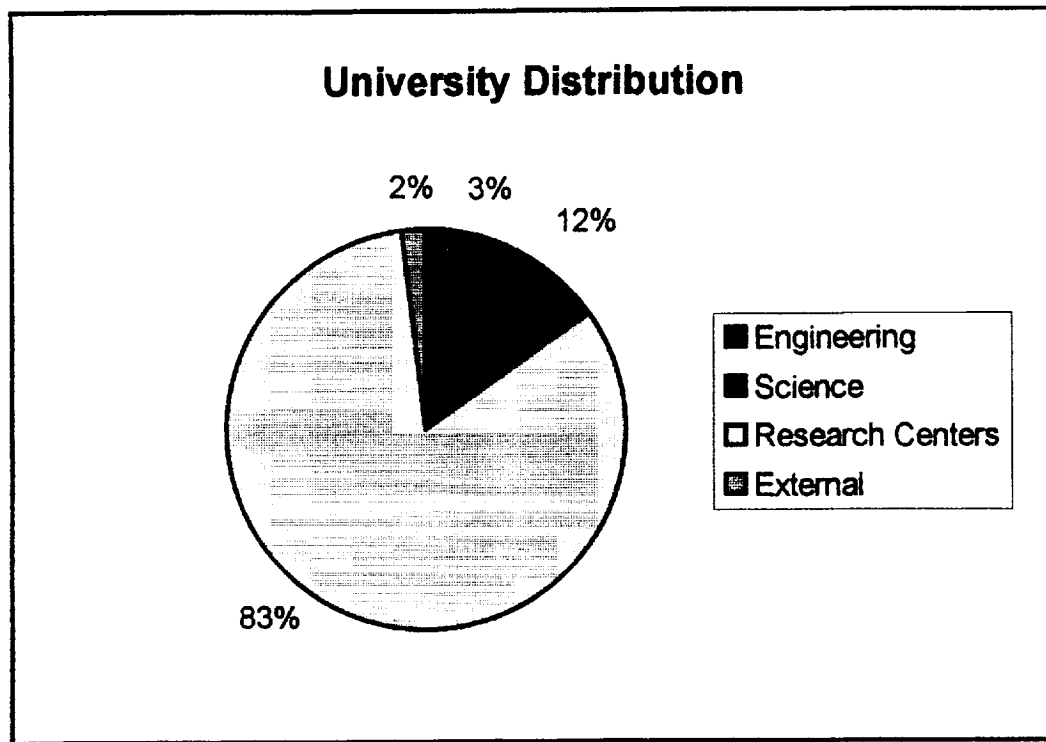
The following charts reflect the evaluation activity performed in this work. Of particular interest is the relative number of evaluations that were rated 1 or 2, since these have been considered appropriate for publication in NASA Tech Briefs. Figure 1 shows how the 321 evaluations were rated in terms of percentages. Note that overall 67% of the submissions were recommended for publication in the 1 or 2 category.

Figure 1. Percentages of submissions and their ratings.



Another chart has been developed to show how the evaluations were distributed across the faculty and research personnel at UAH. The various disciplines described above were fairly broad; however, UAH has very broad base of expertise with the Schools of Science and Engineering and the Research Centers. The large percentage of evaluations performed in the research centers is primarily a reflection of the ability of those individuals to perform the evaluations with the time frame allotted (one week). In many cases, UAH faculty members are also members of a research center and the distinction between the two can be difficult.

Figure 2. Distribution of evaluations within UAH



### Summary

The evaluation of research submittals for publication in NASA Tech Briefs has been performed over the last 8 months. Of the 321 submissions evaluated, 216 or 67% were judged to be worthy of publication. The broadness of expertise required for evaluation was easily handled by members of the faculty and research centers at UAH.

Appendix A itemizes each submission.

**Appendix A**  
**Tech Brief Submissions**

MSFC No.	Title of Submission	Date Received	Faculty Name	Forwarded to MSFC	Classification
26210	Automatic Self-Powered KET Pump for Enhanced Cooling	5/21/93	G. Doane	5/27/93	2
26217	Advanced Flow-Polishing and Surface Metrology of the 5056X-ray & Telescope	5/21/93	W. Kaukler	5/27/93	2
26233	Fracture-Tough, stainless Bearing Steel	5/21/93	W. Kaukler	5/27/93	1
26234	Production of Asymmetric Membranes and Composition thereof	5/21/93	Workman	5/27/93	1
26236	Thin Film Ultrasonic Transducer for Accurate Control of Fastener Clamp Load	5/21/93	Workman	5/27/93	1
26237	Vacuum Tight Carbon/Epoxy Composite Tubing	5/21/93	Workman	5/27/93	2
26240	Advanced CFD Methodology for Fast Transients Encountered in Non-linear Combustion Instability Problems	5/21/93	F. Wang	5/27/93	4
26241	Weld Analysis and Control System	5/21/93	G. Doane	5/27/93	1
26243	Linear Displacement Transducer Calibration Mounting Fixture	5/21/93	G. Doane	5/27/93	3
26246	Embedded Fiber Optic Connector	5/21/93	Workman	5/27/93	1
26248	CFD Modeling of Turbulent Flows Around the SSME Main Injector Assembly Using Porosity Formulation	5/21/93	F. Wang	5/27/93	3
26249	Design of a Geostationary Optical System for Use as an Imager or Infrared Sounder	5/21/93	F. Wang	5/27/93	1
26250	A New Hydrogen Resistant Fe-Ni-Base Superalloy	5/21/93	W. Kaukler	5/27/93	1
26253	High Field Low Mass Permanent Magnet Furnace and Shielding Development for Applications in Space	5/21/93	W. Kaukler	5/27/93	2



MSFC No.	Title of Submission	Date Received	Faculty Name	Forwarded to MSFC	Classification
26235	Small Modulation Ellipsometer	5/27/93	L. Clune	6/3/93	1
26238	Optical Edge Sensors for Large Semented Arrays	5/27/93	L. Clune	6/3/93	3
26247	Panoramic Video System	5/27/93	L. Clune	6/3/93	4
27279	Heat Sink Effects in Variable Polarity Plasma Arc Welding	5/27/93	W. Kaukler	6/3/93	3
27287	Anthropomorphic Teleoperation: Controlling Remote Manipulators with the Dataglove	5/27/93	Workman	6/3/93	3
27291	Study of Enhancing Critical Current Densities and Critical Temperature of High Temperature Superconductors	5/27/93	W. Kaukler	6/3/93	4
27295	Improved Pulsed Discharge TE Laser Final Technical Report	5/27/93	Workman	6/4/93	3
26258	Calculation of Surface Pressure Fluctuations Based on Time-Averaged Turbulent Flow Computations	5/27/93	F. Wang	6/8/93	3
27281	Development of a Pressure Based Multi-grid Solution Method for Complex Fluid Flows	6/1/93	F. Wang	6/8/93	4
27289	UP Weld Evaluation	6/1/93	W. Kaukler	6/8/93	2
27290	Diffraction Optics Technology and the NASA Geostationary Earth	5/27/93	L. Clune	6/15/93	1
27301	Applications of FEM and BEM in two-dimensional Fracture Mechanics Problems	5/27/93	Workman	6/15/93	3
27288	Linear Elastic Fracture Mechanics Primer	5/27/93	Workman	6/15/93	1
27304	Project Summary Innovative Magnetic Suspension Technology for Space Shuttle Main Engine Turbopumps	5/27/93	Doane	6/17/93	1

MSFC No.	Title of Submission	Date Received	Faculty Name	Forwarded to MSFC	Classification
26235	Small Modulation Ellipsometer	5/27/93	L. Clune	6/3/93	1
26238	Optical Edge Sensors for Large Semented Arrays	5/27/93	L. Clune	6/3/93	3
26247	Panoramic Video System	5/27/93	L. Clune	6/3/93	4
27279	Heat Sink Effects in Variable Polarity Plasma Arc Welding	5/27/93	W. Kaukler	6/3/93	3
27287	Anthropomorphic Teleoperation: Controlling Remote Manipulators with the Dataglove	5/27/93	Workman	6/3/93	3
27291	Study of Enhancing Critical Current Densities and Critical Temperature of High Temperature Superconductors	5/27/93	W. Kaukler	6/3/93	4
27295	Improved Pulsed Discharge TE Laser Final Technical Report	5/27/93	Workman	6/4/93	3
26258	Calculation of Surface Pressure Fluctuations Based on Time-Averaged Turbulent Flow Computations	5/27/93	F. Wang	6/8/93	3
27281	Development of a Pressure Based Multi-grid Solution Method for Complex Fluid Flows	6/1/93	F. Wang	6/8/93	4
27289	UP Weld Evaluation	6/1/93	W. Kaukler	6/8/93	2
27290	Diffraction Optics Technology and the NASA Geostationary Earth	5/27/93	L. Clune	6/15/93	1
27301	Applications of FEM and BEM in two-dimensional Fracture Mechanics Problems	5/27/93	Workman	6/15/93	3
27288	Linear Elastic Fracture Mechanics Primer	5/27/93	Workman	6/15/93	1
27304	Project Summary Innovative Magnetic Suspension Technology for Space Shuttle Main Engine Turbopumps	5/27/93	Doane	6/17/93	1

MSFC No.	Title of Submission	Date Received	Faculty Name	Forwarded to MSFC	Classification
27309	Orbitec Multi-Degree-of-Freedom Robotic End-Effector Sensor	6/15/93	Workman	6/17/93	1
27296	Real Time Monitoring and Analysis of Thermal Spray Processing Using Machine Vision	5/27/93	Workman	6/18/93	2
27299	A Distributed Autonomous Coordination Architecture for Functionally Redundant Systems	5/27/93	Workman	6/18/93	3
27300	Fast 3-D Imaging	5/27/93	Workman	6/18/93	2
27302	Instruction Manual for UTEP Weld Gas Hydrogen Detector	5/27/93	Kaukler	6/18/93	3
27305	Torch Improvements for Plasma Arc Welding Applications	5/27/93	Kaukler	6/18/93	1
27306	Net-Shape Fabrication of Graphite/Magnesium MMC Space Structural Joint Components with Built-in Metallic Inserts	5/27/93	Kaukler	6/18/93	2
27307	Structural Damping with Shape Memory Alloys	5/27/93	Workman	6/18/93	2
26244	Cryocooler for Direct Circulation of Refrigerants to Instruments, Shields, and Dewars	5/27/93	Frederick	6/22/93	2
27315	Optimal Control Computer Programs	5/27/93	Doane	6/22/93	3
28618	Magnetic Resonance Imaging (MRI) Tech.	6/18/93	Workman	6/22/93	3
28766	Wedged Valve Shaft Seal Cartridge	6/18/93	Workman	6/22/93	4
28768	Three Port Ball Selector Valve With Constant Flow and Pressure Drop	6/18/93	Workman	6/22/93	4
28770	Wedged Ball Valve Seal	6/18/93	Workman	6/22/93	4
28781	Noise Environment Demonstrator	6/18/93	Workman	6/22/93	3
28786	Equipment Restraint	6/18/93	Workman	6/22/93	3

MSFC No.	Title of Submission	Date Received	Faculty Name	Forwarded to MSFC	Classification
28791	Firmware Controller	6/18/93	Workman	6/22/93	3
27311	Fingerprinting of Materials	6/17/93	Kaukler	6/24/93	1
28777	Functional Unit - Space Station Freedom	6/17/93	Kaukler	6/24/93	3
28790	Mobility Aid (Handrail)	6/22/93	Workman	6/24/93	3
28792	Generalized Method for Multiple Robotic Manipulator Programming Applied to Vertical-Up Welding	6/17/93	Workman	6/24/93	1
28793	Dual Brushless Resolver Rate Sensor	6/17/93	Doane	6/24/93	2
28794	Spatial Modulation Collimator for Viewing the Sun in Hard X-Rays	6/17/93	Kaukler	6/24/93	3
28721	A Computer Model for Liquid Jet Automation in Rocket Thrust Chambers	6/22/93	Wang	6/29/93	1
28762	Laser Atmospheric Wind Sounder (LAWS) Phase II, Preliminary Design	6/22/93	Wang	6/29/93	4
28783	Contamination Sensing System	6/22/93	Wang	6/29/93	3
28784	Contamination Warning System	6/22/93	Wang	6/29/93	3
28785	Automated Housekeeper (Space Station Wall Cleaning Rover)	6/22/93	Wang	6/29/93	4
27315	Shear Joint Capability Versus Bolt Clearance	6/17/93	Workman	6/30/93	1
28815	Clutch, Electric, Positive Lock Up	6/17/93	Doane	6/30/93	4
28817	Rum Auxiliary Control Mechanism for Positioning and Ground/Space-Based Gimballed Payloads	6/17/93	Doane	6/30/93	1
28812	Quick Setup and Toll Angle Test Fixture for Optical Computer Reading of Part Bar Codes	6/17/93	Kaukler	7/6/93	3

MSFC No.	Title of Submission	Date Received	Faculty Name	Forwarded to MSFC	Classification
28813	Ternary Gas Plasma Arc Welding	6/17/93	Kaukler	7/6/93	3
27312	The Effects of Compressive Preloads on the Compression-After-Impact Strength of Carbon/Epoxy	6/17/93	Wallace	7/6/93	2
28759	High Performance Structural Laminate Material for Use to 1000 deg. F	6/17/93	Wallace	7/6/93	1
27314	The Mechanism of Bolt Loading	6/22/93	Workman	7/8/93	2
28804	Data Acquisition and Plotting System (DAPS TM) for Measurement of Reactive Urethane Foam Rheology	6/22/93	Workman	7/8/93	2
28807	Rapid Sample reparation and Analysis by ICP/APES of Cured SLA+561 Super Light Weight Ablator	6/22/93	Workman	7/8/93	2
28771	Definition and Design of an Experiment to Test Raster Scanning with Rotating Unbalanced-Mass Devices on Gimbaled Payloads	6/22/93	Doane	7/8/93	1
28787	Torso Restraint	6/22/93	Workman	7/8/93	2
28788	Anchor with Hex Stub and Anchor with Tether Loop	6/22/93	Workman	7/8/93	3
28789	Mobility Aid Attachment with Hex Stud and Tether Loop	6/22/93	Workman	7/8/93	3
28803	Quantitative Multivariate Chemical Analysis for the Determination of B-250 Spray Ratio	6/22/93	Workman	7/8/93	1
28805	Use of Fluorinated Ethers as Blowing Agents in Polyurethane Based Foam Insulations	6/22/93	Workman	7/8/93	1
28809	ATC "Super Chip"	6/22/93	Doane	7/8/93	1

MSFC No.	Title of Submission	Date Received	Faculty Name	Forwarded to MSFC	Classification
28806	Simplification of the Derivation and Calculation of the Least Square Fit of a Sphere or Circle to Multiple Point Measurements	6/22/93	Doane	7/8/93	3
28810	High Performance Rolling Element Bearing	6/22/93	Kaukler	7/8/93	1
28831	Use of a High Energy Magnesium/Zirconium X-Ray Anode for the Simultaneous Determination of Al metal and Aluminum Oxide on Al Alloy 229 Surfaces	6/22/93	Kaukler	7/8/93	1
28838	Novel Process for Producing Torch Grown Diamond Films	6/22/93	Kaukler	7/8/93	2
26257	Novel Bridgemen-Stockbarger Melt Growth System for Organic Nonlinear Optical Materials	6/22/93	Kaukler	7/8/93	3
28828	Plasma Gas Swirl Ring for MSFC Plasma Arc Welding Torch	6/22/93	Kaukler	7/8/93	2
26255	New improved Electron Beam Furnace	7/1/93	Kaukler	7/13/93	2
26256	An Anticipatory Fuzzy Logic Controller Utilizing Neural Network Prediction	7/1/93	Workman	7/13/93	1
26258	Calculation of surface Pressure Fluctuations Based on Time-Averaged Turbulent Flow Computations	7/1/93	Wang	7/13/93	2
27281	Development of a Pressure Based Multigrid Solution Method for Complex Fluid Flows	7/1/93	Wang	7/13/93	Reclass 3
27294	Light Driven Waste Remediation System Utilizing Phototrophic Bacteria	7/1/93	Eley	7/13/93	4
28821	Borescope Inspection Using Mirror Adapter	7/1/93	Workman	7/13/93	1
28823	Modified Wedge Ball Seal	7/1/93	Workman	7/13/93	2
28829	Quick Connect Bolt	7/1/93	Workman	7/13/93	1

MSFC No.	Title of Submission	Date Received	Faculty Name	Forwarded to MSFC	Classification
28833	Axially Installed Internally Threaded Fasteners	7/1/93	Workman	7/13/93	1
28834	Poppet Valve, Low Leak/High Flow	7/1/93	Workman	7/13/93	2
26260	Solution-Adaptive Finite Element Method in Computational Fracture Mechanics	7/3/93	Wang	7/16/93	3
28753	Regometer Incremental Probe #3802110-3 & -9	7/3/93	Doane	7/16/93	2
28816	Fully Coupled Thermo-Structured Governing Equations	7/3/93	Wang	7/16/93	3
28820	Permanent Magnet Launches	7/3/93	Wang	7/16/93	2
28824	Programmable Constant Output Proportioner	7/3/93	Doane	7/16/93	1
28825	Aerostructural Safety Factor Criteria Using Deterministic Reliability	7/3/93	Wang	7/16/93	2
28836	Damping Jacket for a Helical Spring	7/3/93	Doane	7/16/93	3
28837	Fluidic Speed Control for Turbines	7/3/93	Doane	7/16/93	2
28889	Flaw Location Scale for X-ray Film Component Flaws	7/3/93	Workman	7/16/93	3
28903	Highly Functional Remote Neural Pendant	7/3/93	Workman	7/16/93	2
29945	Video System for Viewing Arc Welding Built Into Railing Shield	7/3/93	Workman	7/16/93	3
29953	Automated Ultrasonic Shear Wave NDE Using a Dry Couplant	7/3/93	Workman	7/16/93	1
28826	A Triangular Aluminum Thrust Structure	7/13/93	Frederick	7/20/93	3
28840	Advances in Temperature Measurements for Carbon Cloth Phenolic Nozzle Exit Cones	7/13/93	Frederick	7/20/93	1

MSFC No.	Title of Submission	Date Received	Faculty Name	Forwarded to MSFC	Classification
28900	External Thread Current Inspection System	7/13/93	Workman	7/20/93	1
28901	Stud-Bee Installation and Stabilization Tool	7/13/93	Workman	7/20/93	2
28902	Anti-Dent Bearing Ball Retainer	7/13/93	Workman	7/20/93	2
28905	Determination of Water at PPM Concentration in Freon PCA By GC/TC	7/13/93	Workman	7/20/93	1
29910	Hand Switch for Alloy Dispenser Cartridges	7/13/93	Workman	7/20/93	2
28904	Plasma Coated Foam	7/13/93	Kaukler	7/20/93	2
29949	Improved Investment Casting Procedure, Incorporating Centrifugal Casting, SSME High Pressure Nozzles	7/13/93	Kaukler	7/20/93	2
29950	Weld Repair of Main Combustion Chamber Liner	7/13/93	Kaukler	7/20/93	3
28842	Blade Lock for a Rotor Disk and Rotor Blade Assembly	7/13/93	Workman	7/22/93	2
28843	Sampling Apparatus and Content Analysis of Cylindrical Enclosures	7/13/93	Workman	7/22/93	2
28846	Five Channel Polychromator Head	7/13/93	Workman	7/22/93	1
28849	Variable Shim Thickness Flexseal	7/13/93	Workman	7/22/93	3
28851	Automated Stripping of Aft Skirt Foam	7/13/93	Doane	7/22/93	1
28883	Warning Device for Aircraft Battery Preservation	7/13/93	Doane	7/22/93	3
28884	Back Face Ablator	7/13/93	Workman	7/22/93	3
28885	Flat Pattern Development for Measuring Locations on Conical Surface	7/13/93	Workman	7/22/93	3
28887	Tape Measure with Angular Scales	7/13/93	Doane	7/22/93	3



MSFC No.	Title of Submission	Date Received	Faculty Name	Forwarded to MSFC	Classification
28888	Positioning of Components on Double-Curved Surface	7/13/93	Doane	7/22/93	3
29955	On Demand Fan for Welding Power Supply	7/13/93	Doane	7/22/93	3
29956	Tandem Design for Backward Swept Inducer	7/13/93	Doane	7/22/93	2
26254	Attachment of Fiber Re-inforced Metal Matrix Composite Components Using Built-in Metallic Inserts	7/22/93	Wallace	7/28/93	1
26259	Improvement to Howmet's Microcast X Process	7/22/93	Wallace	7/28/93	2
28839	Crystals of Human & Canine Serum Albumin Suitable for Genetic Engineering & Rational Drug Design	7/22/93	Eley	7/28/93	2
28906	Apparatus and Method for Determining Chemical Toxicity in Pollution Monitoring and Pharmaceutical Testing	7/22/93	Eley	7/28/93	1
29958	Improved Composite Load Spectra Component Scaling Criteria	7/22/93	Workman	7/28/93	1
29959	Void Volume Inerting	7/22/93	Workman	7/28/93	3
29970	Strain Gage Bonding and Integrity Checker	7/22/93	Workman	7/28/93	3
29968	Generalized Fluid Acoustic Wave Propagation Algorithm Enhancement #2	7/22/93	Workman	7/28/93	1
28779	Portable Emergency Eye Flush Assembly	7/22/93	Doane	7/28/93	3
28844	Gas Arc Constriction for Plasma Arc Welding	7/22/93	Doane	7/28/93	3
28886	Flat Pattern Dev. for Aiming XRay Machine at Parts or Comp. which are equipped with laser spotting beam that is aligned with xray	7/22/93	Doane	7/28/93	2
29954	Reed Stability	7/22/93	Doane	7/28/93	1

MSFC No.	Title of Submission	Date Received	Faculty Name	Forwarded to MSFC	Classification
29960	Environmental Data Recording & Analysis	7/22/93	Doane	7/28/93	3
29961	Wireless Infra Red Control Pendant	7/22/93	Doane	7/28/93	3
29962	Air Spring Actuation for Aqueous Cleaning	7/22/93	Doane	7/28/93	2
29968	Generalized Fluid Acoustic Wave Propagation Algorithm Enhancement #2	7/22/93	Workman	7/28/93	1
29969	A Refined Analytical Tool for Assessing Flow/Induced Vibration in Flex. Lines	7/22/93	Doane	7/28/93	1
28841	Measurement of Stress or Pressure of Carbon Phenolic Nozzle Materials During Hot Temperature Testing	7/29/93	Frederick	8/10/93	2
28850	Machine Vision Based Optical System for Detecting and Tracking Minute Flaws in a Smooth Metallic Surface of Large Area	7/29/93	Frederick	8/10/93	1
28861	Characterizing the Uncertainty in Holddown Post Load Measurements	7/29/93	Doane	8/10/93	2
28863	Effect of Load on Stress Analysis of Thin-Walled Ducts	7/29/93	Workman	8/10/93	2
28866	Bulge Formed Cooling Channels with a Variable Lead Helix on a Hollow Body of Revolution	7/29/93	Doane	8/10/93	1
28867	New Marking Method for Ceramics, Mica and Graphite	7/29/93	Doane	8/10/93	1
28869	Modified C-Seal for Increased Resiliency	7/29/93	Workman	8/10/93	3
29965	Use of Ultem 2200-1000 Plastic Material in Place of 6061-T4 Aluminum for Controller Coolant Diffuser	7/29/93	Kaukler	8/10/93	3
29967	Computed Tomography Inspection Indications on SSME HPFTP Turbine Blades	7/29/93	Kaukler	8/10/93	3
29975	Real-Time Failure Control Algorithm	7/29/93	Doane	8/10/93	2

MSFC No.	Title of Submission	Date Received	Faculty Name	Forwarded to MSFC	Classification
29976	Multi-Pass Laser Welding Using a Line Lens/Mirror Focusing Optic	7/29/93	Workman	8/10/93	2
29977	Hand Operated Gap Measuring Gun	7/29/93	Doane	8/10/93	3
29978	Wax Verification by Liquid Nitrogen Tech.	7/29/93	Workman	8/10/93	1
29980	Utilization of Ferrite Indicator Device for Verification of Adequate Alloy 903 Overlay Protection Against Hydrogen Embrittlement of Alloy 718 Material	7/29/93	Workman	8/10/93	2
29982	Performance Verification Testing of Dynamic Sensors Using a Particle Impact Noise Detector	7/29/93	Doane	8/10/93	2
29983	Preheat System for Vacuum Plasma Spray Processing	7/29/93	Doane	8/10/93	1
28864	Three Port Ball Selector Valve with Constant Flow and Pressure Drop	7/29/93	Workman	8/10/93	1
29979	Hand Operated Tube Expander	7/29/93	Workman	8/10/93	1
27308	Improved Stirling Cycle Technology for Zero-g Spacecraft Refrigeration Systems	7/23/93	Karr	8/11/93	3
27298	High-Loss Structural Coupons Made by Co-Curing Viscoelastic Materials and Heaters with Graphite/Epoxy	7/23/93	Cost	8/11/93	3
27316	Advanced Technology Development Multi-Color Holography	7/23/93	Clune	8/11/93	2
28822	Beam Processing	1/19/93	Kaukler	1/27/93	3
28852	Ampoule Failure Sensor	1/19/93	Kaukler	1/27/93	2
28853	Global Positioning System Synchronized Active Light Target	1/19/93	Doane	2/15/93	2
28854	Power Conserving Stepper Motor	1/19/93	Doane	2/15/93	1

[illegible]

26171	Undercooling and Rapid Quenching Process	9/17/93	Workman	10/1/93	2
26262	Solution Growth of Thin Films of a Polydia-	10/13/93	Workman	10/18/93	1
26262	Solution Growth of Thin Films of a Poly.....	12/8/93	Workman	12/15/93	1
26263	Excursion Set Mediated Genetic Algorithm	10/13/93	Workman	10/18/93	1
26264	Event Driven Crossbar Multiplexer	10/13/93	Doane	10/18/93	3
26265	Extension of Ion Beam Polishing Technology	10/13/93	Workman	10/18/93	3
26266	Integrated Oxygen Recovery System	10/13/93	Workman	10/18/93	1
26267	A Fast Algorithm For Transient All-Speed	10/13/93	Doane	10/18/93	1
26268	Comprehensive Model for Liquid Propellant	10/13/93	Doane	10/18/93	1
26269	Low Temperature Stirling Cycle Refrigerator	10/13/93	Doane	10/18/93	1
26270	Matrix Resin with Particulate Reinforcement	10/20/93	Workman	10/27/93	1
26272	Control of a Flexible Manipulator During	10/20/93	Doane	10/27/93	1
26273	Laser Initiated In-Situ Polymerization of a	10/20/93	Workman	10/27/93	1
26274	Plasma Spray Nozzles that Reduce Overspray	10/20/93	Wang	10/27/93	2
26275	Virups-Virtual Reality Ultrasonic	10/20/93	Doane	10/27/93	2
26276	Braided-Taped Wrapper Rocket Nozzle	10/20/93	Workman	10/27/93	1
26277	Ion Beam Milling of Cryogenically Cooled...	10/27/93	Kaukler	11/5/93	3
26278	Plasma Spray Nozzles that Reduce Overspray..	10/27/93	Workman	11/5/93	3
26279	Mixing Efficiency Diagnostic Using Spectro-...	10/20/93	Workman	10/27/93	2
26280	Doped C60 Fullerene Based Thermal ...	10/27/93	Workman	11/5/93	1
26282	Dialysis Crystal Growth Apparatus & Method	10/27/93	Kaukler	11/5/93	2
26283	Model Dev. for Exhaust Plume Effects on ...	10/28/93	Wang	11/5/93	2
26285	Advanced Electric Motor Plotting	10/27/93	Kaukler	11/5/93	1
26286	Segmented Adaptive Optics Control Solution	10/27/93	Clune	11/5/93	2
26287	Nonscanning Sectioning Microscopes	10/27/93	Kaukler	11/5/93	1
26289	Sub-Pixel Digital Video Image Correlation	10/27/93	Workman	11/5/93	1
26290	Magnetostrictive Trans.for Structured Damp.	11/18/93	Doane	11/30/93	1
26292	Plume Impingement Effects	11/18/93	Wang	11/30/93	1
28761	Launch Vehicle Aero Load Distributions	10/5/93	Doane	10/6/93	3
28776	Development of Automated Methods to Apply	10/5/93	Doane	10/6/93	1
28782	VMC PDR Ventilation Baseline Configuration	10/5/93	Doane	10/6/93	3
28814	High Thermal Conductivity High	9/17/93	Workman	10/1/93	3
28830	Intelligent Thermoelectric Modular Tile	8/12/93	Workman	9/16/93	2
28835	Bayonet Flange, Valve	10/5/93	Doane	10/6/93	3
28845	Tachometer Derived From Resolver and	10/5/93	Doane	10/6/93	1
28847	Composite in Plane Shear Modules at	8/12/93	Wang	9/16/93	3
28856	Conducting Failure Modes and Effects	10/6/93	Wang	10/12/93	1
28865	Stress Simulation Witness Panel for	8/12/93	Wang	9/16/93	1
28868	Trip and Groove Variable Restriction	8/12/93	Workman	9/16/93	3
28870	Bondable Stainless Surface (BOSS) Coatings	10/6/93	Workman	10/12/93	1
28871	Predictions of Final Liner Structural In-	10/13/93	Workman	10/18/93	3
28872	Mechanism, Kinetics, and Development of a	10/6/93	Workman	10/12/93	1
28873	On-Contact Ultrasonics for the Detection of	10/13/93	Workman	10/18/93	3
28874	Thin Strip Method for Measurement of Lin-	10/6/93	Doane	10/12/93	3
28875	Development of Environmentally Friendly	10/6/93	Workman	10/12/93	1
28876	Analytical Process Model for Liner and	10/6/93	Workman	10/12/93	1

28877	Cure Witness Panel Demonstration	10/6/93	Workman	10/12/93	2
28878	Hydraulic Blister Peel Test Apparatus	10/6/93	Doane	10/12/93	2
28879	In Situ Ultrasonic Gage for Propellant	9/17/93	Workman	10/1/93	3
28879	In situ Ultrasonic Gage for Prop. Cure Eval.	10/13/93	Workman	10/18/93	3
28880	Hyperelastic Behavior for HTPB Propellant	10/6/93	Workman	10/12/93	1
28881	Inorganic Thin Film Resistor Stress Gage Sen.	10/6/93	Doane	10/12/93	2
28882	Back Face Ablator	10/6/93	Workman	10/12/93	3
28891	Thoriated Tungsten Extension Rod for	10/6/93	Doane	10/12/93	1
28892	Method for Increasing the Accuracy of	10/6/93	Doane	10/12/93	2
28893	Temperature Tailored Combustion Method	8/12/93	Wang	9/16/93	3
28894	Gas Backside Shielding Parameters and	10/6/93	Workman	10/12/93	1
28895	Utilizing Statistical Penalties in Predicting	10/6/93	Doane	10/12/93	1
28896	Hand Prosthesis Nail Holder	10/13/93	Doane	10/18/93	1
28897	Hydraulic Blister Peel Test Apparatus	10/13/93	Doane	10/18/93	2
28898	Elastomeric Material Char Tenacity Specimen	10/13/93	Workman	10/18/93	3
28899	Large Scale Automated DNA Sequencer	10/13/93	Workman	10/18/93	1
28908	Low Gravity Technology for Adhesion Casting	10/13/93	Workman	10/18/93	1
28909	Electronic Shark Repellant	10/13/93	Doane	10/18/93	3
28910	Elastomeric Modified Carbon Cloth Phenolic	10/13/93	Workman	10/18/93	3
28911	Flexseal Insulator Structural Model Cali-	10/13/93	Doane	10/18/93	2
28912	I-Beam Assembly Platform Concept for the...	10/20/93	Doane	10/27/93	2
28913	Debris Shield from Space Shuttle Ext. Tanks	10/20/93	Wang	10/27/93	3
28914	Bearing Deadband Rollers	10/20/93	Doane	10/27/93	2
28915	Belleville Spring with Scalloped Extensions	10/20/93	Doane	10/27/93	3
28916	Electrically Conducting Thermal Control Coat.	10/20/93	Wang	10/27/93	1
28917	Double-Angled Wall Design for Enhancing...	10/20/93	Wang	10/27/93	2
28918	Internally Replaceable Seal for Pressurized...	10/20/93	Wang	10/27/93	3
28919	Reconfiguring the RUM Experiment to Test...	10/20/93	Doane	10/27/93	1
28920	Grid Design for Fourier X-Ray Detectors	10/27/93	Wang	11/5/93	3
28921	Method and Apparatus for Determining Chem.	10/27/93	Workman	11/5/93	1
28922	Enhanced Performance Elastic Net Design ...	10/27/93	Doane	11/5/93	1
28923	Anodic Thermal Control Coating with .....	10/27/93	Wang	11/5/93	1
28924	Subdivided Seals	10/28/93	Doane	11/5/93	3
28925	Torquing Threaded Fasteners Without ...	10/28/93	Doane	11/5/93	2
28926	Model/Machine Interface system	10/28/93	Wang	11/5/93	3
28927	Powered Bolt	10/28/93	Doane	11/5/93	1
28928	Alternative common Berthing Mechanism ...	10/28/93	Doane	11/5/93	2
28929	Flex Hose Cleaning Facility	10/28/93	Doane	11/5/93	2
28930	Tuneable Rum Aux. cont.Mechanism for ...	11/18/93	Doane	11/30/93	1
28931	Adv.Liq.Rocket chamber Wall Cooling Des...	11/18/93	Wang	11/30/93	3
28932	Reliability Comparison of Engine Concepts	11/18/93	Doane	11/30/93	1
28933	Probabilistic Rocket engine System Optim...	11/18/93	Wang	11/30/93	2
28934	Probabilistic Thermal Design of Rocket ....	11/18/93	Wang	11/30/93	1
28935	Num.Proc. for Coupled CFD/Thermal Cond....	11/18/93	Wang	11/30/93	1
28936	Contact Position Sensor Using constant cont..	11/18/93	Doane	11/30/93	1
28937	Analytical Rep. of Viscoelastic material....	11/18/93	Doane	11/30/93	2

28938	Shelf Life Expiration/Cure Time Calculator	11/18/93	Workman	11/30/93	2
28940	Distallation Unit Controller	11/18/93	Doane	11/30/93	3
28941	Portable Chemlok Spray Booth	11/18/93	Workman	11/30/93	1
28942	Total System Design Analysis of high Perfor..	11/18/93	Workman	11/30/93	2
28946	Interplanetary Trajectory Design Software...	11/18/93	Wang	11/30/93	2
28947	Fast Trip Electric Propulsion Methods	11/18/93	Wang	11/30/93	3
28948	Mars Aerobrake Concepts	11/18/93	Wang	11/30/93	3
28949	Vehicle Assembly Platforms for Mars Trans...	11/18/93	Wang	11/30/93	3
28950	Evolutionary Lunar Transportation Family...	12/1/93	Doane	12/8/93	2
28951	1st Lunar Outpost Habitation System Concept	12/1/93	Workman	12/8/93	3
28952	Lunar Outpost Heat Rejection System	12/1/93	Workman	12/8/93	3
28953	Alternative Habitats for First Lunar Outpost	12/1/93	Workman	12/8/93	1
28954	Rotary Coupling	12/1/93	Wang	12/8/93	2
28955	Extraction Valve	12/1/93	Workman	12/8/93	2
28956	Latching Device	12/1/93	Doane	12/8/93	3
28957	Study on Strength Evaluation of EDNi/EDCu...	12/1/93	Workman	12/8/93	2
28958	Method of Dynamically Adjusting Internal....	12/1/93	Workman	12/8/93	1
28959	New Marking System for Applying Perman....	12/1/93	Workman	12/8/93	2
28960	New Method of Producing Compressed Sym...	12/8/93	Doane	12/15/93	1
28961	New Marking Method for Applying Comp....	12/8/93	Wang	12/15/93	1
28963	Vacuum Door Mechanism	12/8/93	Doane	12/15/93	2
28964	Non-contact Thickness Measurement.....	12/8/93	Workman	12/15/93	2
28966	Resonant Doppler Velocimetry in the SSME...	12/8/93	Wang	12/15/93	3
28967	Multiple Chamber dialysis system for Pro...	12/8/93	Kaukler	12/15/93	2
28968	Reduced Segregation in a Directional Solid....	12/8/93	Kaukler	12/15/93	1
28969	Computer Aided Process Model for Carbon....	12/8/93	Workman	12/15/93	1
29848	Ultrasonic inspection of Inlet/outlet	9/17/93	Workman	10/1/93	2
29963	FARS Ring Sizing Tool for SSME Main	8/12/93	Wang	9/16/93	2
29964	Flushing Manifold for Nozzle Tubes	8/12/93	Wang	9/16/93	2
29966	A Computational Engineering System for	8/12/93	Wang	9/16/93	1
29971	FREEDOM - Frequency Domain	8/12/93	Wang	9/16/93	1
29972	Evaluation Criteria and a Procedure for	8/12/93	Wang	9/16/93	2
29973	CFD Base Heating Analysis of the NLS 1.5	8/12/93	Wang	9/16/93	1
29981	Blade Tip Rubbing Stress Prediction	8/12/93	Wang	9/16/93	1
30001	Verification of Red Dye Penetrant Removal	11/18/93	Workman	11/30/93	1
30002	Application of Reinforced Urethane Elast.....	11/18/93	Workman	11/30/93	2
30003	Dev. and Application of LPF Discharge Duct....	11/18/93	Workman	11/30/93	2
30005	Removable Mandrels for Net-shape Vacuum...	11/18/93	Doane	11/30/93	1
30007	Coordinate Measuring Machine (CMM) Soft....	11/18/93	Doane	11/30/93	2
30008	Optimized Coolant Flow diverter for Imp.....	11/18/93	Doane	11/30/93	1
30009	Use of Dual Eccentrics to Alleviate Misalign...	11/18/93	Doane	11/30/93	2
30010	Transparent 16-bit Transfer Card	11/18/93	Workman	11/30/93	1
30011	Imp. Test Coupon for Mechan.Prop.of Ther....	11/18/93	Wang	11/30/93	3
30012	Enhanced insp. tool for measuring opera.....	11/18/93	Doane	11/30/93	2
30013	Prot.Wire-Arc Sprayed Metallic Coating ....	11/18/93	Wang	11/30/93	1
30014	Minimal Cost Aqueous Cleaning System	12/1/93	Workman	12/8/93	2

30015	SSME Pressure Sensor PIND (Pressure ....	12/1/93	Doane	12/8/93	2
30016	Laser Velocimeter Axial Plane Data Red.....	12/1/93	Workman	12/8/93	1
30017	Utilize Stepper Motor for the Remote Cont.....	12/1/93	Doane	12/8/93	3
30018	Use of Computed Tomography CT for Preli.....	12/1/93	Workman	12/8/93	1
30019	Power Balance Model MCC Heat Load Multi....	12/1/93	Wang	12/8/93	2
30020	Robotic End Effector for MCC hot Wall Weld...	12/1/93	Workman	12/8/93	1
30021	Non-Chromated Thin Film Anodizing Proc.....	12/1/93	Workman	12/8/93	1
30022	Chill Bar Assembly for MCC Hot Wall Weld....	12/1/93	Wang	12/8/93	1
30023	Quad Timer	12/1/93	Doane	12/8/93	3
30024	Computer Model for Determining SSME .....	12/1/93	Doane	12/8/93	2
30025	Development and Certification of Electroly....	12/1/93	Workman	12/8/93	1
30026	Measuring Tool Leveling Indicator	12/1/93	Wang	12/8/93	1
30027	90 Degree Telescoping Electrode	12/1/93	Doane	12/8/93	2
30028	Feed Forward Adaptive Machinery for Large...	12/1/93	Doane	12/8/93	2
30029	Power Balance Model (PBM) Tabular Data....	12/1/93	Wang	12/8/93	2